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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/916,618	07/26/2001	Geeng-Chuan Chern	2102397-911600	9435

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EXAMINER

WEISS, HOWARD

ART UNIT PAPER NUMBER

2814

DATE MAILED: 12/11/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/916,618

Applicant(s)

CHERN, GEENG-CHUAN

Examiner

Howard Weiss

Art Unit

2814

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 30 September 2002.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 23-32 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 23-32 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☒ The proposed drawing correction filed on 30 September 2002 is: a) ☒ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

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Attorney's Docket Number: 2102397-911600

Filing Date: 7/26/01

Continuing Data: Claims benefit of 60/283,110 (4/10/01)

Claimed Foreign Priority Date: none

Applicant(s): Chern

Examiner: Howard Weiss

Drawings

1. The proposed drawing correction and/or the proposed substitute sheets of drawings, filed on 9/30/02 have been approved. A proper drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The correction to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 23 to 27 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.
4. Claim 23 recites the limitation "the first insulation layer first portion" in Lines 13 and 14. There is insufficient antecedent basis for this limitation in the claim.
5. Claim 23 recites the limitation "the first insulation layer second portion" in Lines 14. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 23 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wang (U.S. Patent No. 5,811,853), Koh (U.S. Patent No. 5,493,138) and Chen (U.S. Patent No. 6,091,104 and hereinafter Chen '104).

Wang shows most aspects of the instant invention (e.g. Figures 2 to 8) including:

- a semiconductor substrate **34** of a first conductivity
- first **36** and second **62** second conductivity regions with a channel region therebetween
- a first insulation layer **42** disposed over said substrate
- a floating gate **44** disposed over portions of the first insulation layer and the channel region
- a control gate **48** formed over and adjacent to said floating gate and having vertical sidewalls
- an insulation spacer **54** and a third insulation layer (not labeled) formed over said control gate

Wang does not show a second insulation layer of tunneling thickness having a first portion disposed over said first insulation and said substrate, a second portion disposed adjacent the floating gate and a third portion disposed over the floating gate, and the second region having an edge aligned with the vertical sidewall of the control gate.

Koh teaches (e.g. Figure 8) to form a tunnel insulating layer with third and second portions **78** over and adjacent, respectively, to a floating gate **22** and a first portion **76** disposed over a first insulation **20** and a substrate **12** to improve the integrity of the insulating layer between the floating gate and the control gate (Column 3 Lines

61 to 67). It would have been obvious to a person of ordinary skill in the art at the time of invention to form a tunnel insulating layer with third and second portions over and adjacent, respectively, to a floating gate and a first portion disposed over a first insulation and a substrate as taught by Koh in the device of Wang to improve the integrity of the insulating layer between the floating gate and the control gate.

Chen '104 teaches (e.g. Figure 4G) to align the edge of an impurity region **64** with the edge of the vertical sidewall of a gate **59** and a spacer **66** to improve the performance of the device (Column 3 Lines 38 to 40). It would have been obvious to a person of ordinary skill in the art at the time of invention to align the edge of an impurity region with the edge of the vertical sidewall of a gate and a spacer as taught by Chen '104 in the device of Wang to improve the performance of the device.

8. Claims 25 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wang, Koh and Chen '104, as applied to claim 23 above, and further in view of admitted Prior Art Figure 1C.

Wang, Koh and Chen '104 show most aspects of the instant invention (Paragraph 7) except for the sharp edge of the floating gate extending into the control gate and a notch into which said sharp edge extends. Admitted Prior Art Figure teaches that it is common, and therefore obvious, to form a notch in a control gate **6** for a sharp edge of a floating gate **1**.

9. Claim 27 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wang, Koh and Chen '104, as applied to claim 23 above, and further in view of Lee et al. (U.S. Patent No. 5,751,048)

Wang, Koh and Chen '104 show most aspects of the instant invention (Paragraph 7) except for the layer of metalized silicon aligned to the insulation spacer. Lee et al. teach (e.g. Figure 2E) to align a conductive contact to spacers **36** for good step

coverage and reliability (Column 4 Lines 23 to 25). It would have been obvious to a person of ordinary skill in the art at the time of invention to align a conductive contact to spacers as taught by Lee et al. in the device of Wang, Koh and Chen '104 for good step coverage and reliability

10. Claim 28 and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wang, Koh and Chen '104, as applied to claim 23 above, and further in view of Chen (U.S. Patent No. 6,140,182 and hereinafter Chen '182).

Wang, Koh and Chen '104 show most aspects of the instant invention (Paragraph 7) except for the spaced apart isolation regions. Chen '182 teaches (e.g. Figures 3E and 4) to use isolation regions **36** to provide a new and improved semiconductor device with cell isolation (Column 2 Lines 19 and 20). It would have been obvious to a person of ordinary skill in the art at the time of invention to use isolation regions as taught by Chen '182 in the device of Wang, Koh and Chen '104 to provide a new and improved semiconductor device with cell isolation.

11. Claims 30 and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wang, Koh, Chen '104, and Chen '182, as applied to claim 28 above, and further in view of admitted Prior Art Figure 1C.

Wang, Koh, Chen '104, and Chen '182 show most aspects of the instant invention (Paragraph 10) except for the sharp edge of the floating gate extending into the control gate and a notch into which said sharp edge extends. Admitted Prior Art Figure teaches that it is common, and therefore obvious, to form a notch in a control gate **6** for a sharp edge of a floating gate **1**.

12. Claim 32 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wang, Koh, Chen '104, and Chen '182, as applied to claim 28 above, and further in view of Lee et al. (U.S. Patent No. 5,751,048)

Wang, Koh, Chen '104, and Chen '182 show most aspects of the instant invention (Paragraph 10) except for the layer of metalized silicon aligned to the insulation spacer. Lee et al. teach (e.g. Figure 2E) to align a conductive contact to spacers **36** for good step coverage and reliability (Column 4 Lines 23 to 25). It would have been obvious to a person of ordinary skill in the art at the time of invention to align a conductive contact to spacers as taught by Lee et al. in the device of Wang, Koh, Chen '104, and Chen '182 for good step coverage and reliability

Response to Arguments

13. The Applicant's arguments filed 9/30/02 have been fully considered but they are not persuasive. In response to the applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, Chen '104 state that to align the edge of an impurity region **64** with the edge of the vertical sidewall of a gate **59** and a spacer **66** improves the performance of the device. Support for this is given in further detail in Column 5 Line 64 to Column 6 Line 19 and Column 10 Lines 43 to 67 (e.g. faster performance and small sheet resistance).

In reference to the three portions of the second insulation layer, the rejection has been modified to point out theses features in Koh (Paragraph 7). In view of these reasons and those set forth in the present office action, the rejections of the stated claims stand.

Conclusion

14. The Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

15. Papers related to this application may be submitted directly to Art Unit 2814 by facsimile transmission. Papers should be faxed to Art Unit 2814 via the Art Unit 2814 Fax Center located in Crystal Plaza 4, room 3C23. The faxing of such papers must conform with the notice published in the Official Gazette, 1096 OG 30 (15 November 1989). The Art Unit 2814 Fax Center number is **(703) 308-7722** or **-7724**. The Art Unit 2814 Fax Center is to be used only for papers related to Art Unit 2814 applications. The official TC2800 Before-Final, **(703) 872-9318**, and After-Final, **(703) 872-9319**, Fax numbers will provide the fax sender with an auto-reply fax verifying receipt of their fax by the USPTO.

16. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Howard Weiss at **(703) 308-4840** and between the hours of 8:00 AM to 4:00 PM (Eastern Standard Time) Monday through Friday or by e-mail via **Howard.Weiss@uspto.gov**. Any inquiry of a general nature or relating to

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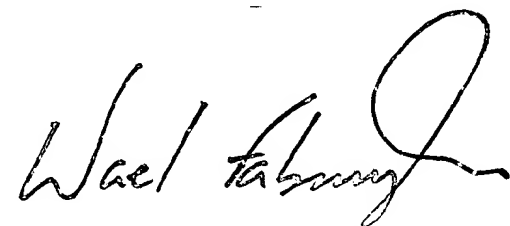
the status of this application should be directed to the Group 2800 Receptionist at
(703) 308-0956.

17. The following list is the Examiner's field of search for the present Office Action:

Field of Search	Date
U.S. Class / Subclass(es): 257/ 319,321; 438/ 265	thru 12/5/02
Other Documentation: none	
Electronic Database(s): EAST, IEL	thru 12/5/02

HW/hw
5 December 2002

Howard Weiss
Examiner
Art Unit 2814



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